

THE REVIEW

DEVOTED TO THE INTERESTS OF THE AMERICAN SOCIETY FOR METALS

Volume IX

MAY, 1936

No. 3

Reservations for Metal Show Break Record

Mine Hoist Is Inspected in Visit to Plant

Canadian Allis-Chalmers Opens Doors to Members of Montreal Chapter

Montreal Chapter, March 2—The Chapter's regular monthly meeting, held at the Windsor Hotel, adjourned immediately following dinner to the Engineering Works of the Canadian Allis-Chalmers Rockfield Plant, Lachine. Open house was held to the Society and its guests, numbering 300-odd visitors.

The gathering inspected a large mine hoist, shortly to be shipped to the International Nickel Co., Sudbury, for the Creighton Mine. The engine, com-

Five Societies Will Take Part in Metal Congress

After a lapse of several years, the American Society of Mechanical Engineers' Machine Shop Practice and Iron and Steel Divisions will again be represented in the National Metal Congress, to be held in Cleveland, Oct. 19 to 23.

Other cooperating societies are the American Society for Metals, the Wire Association, the Institute of Metals and Iron and Steel Divisions of the American Institute of Mining and Metallurgical Engineers, and the American Welding Society.

pletely assembled, was turned over at one-quarter its normal full load speed. This machine is believed to be the largest electric mine hoist ever built on the North American continent and equals any built to date in Europe. It is powered by two 1250-hp. 25-cycle

(Continued on Page 10)

Lecture Course Ends

Subject at Philadelphia Was "Why's and Wherefore's of Steel Treatment"

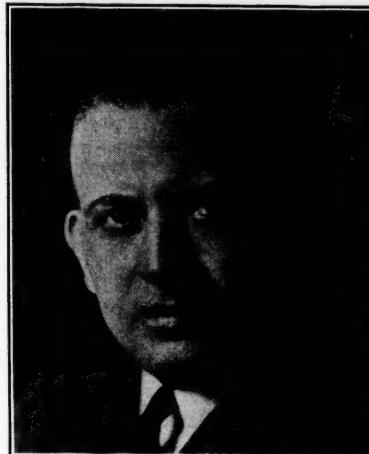
"The Why's and Wherefore's of Steel Treatment" was the subject of the Philadelphia Chapter's lecture course, completed in April.

Chairman W. J. Diedericks and his committee deserve much credit for the success of the course. They selected a popular subject and one that should prove of great value.

The total registration was 260 and the average attendance was 135. At least 18, and probably many more, new members were gained from the course.

The lecturers for the course are all members of the Philadelphia Chapter. They are W. J. Diedericks, metallurgist, Autocar Co.; A. W. Grosvenor, assistant professor of mechanical engineering, Drexel Institute; H. C. Knerr, president, Metallurgical Laboratories; F. T. Updike, engineer of tests, J. A. Roebling's Sons Co.; Joseph Winlock, metallurgist, Edw. G. Budd Mfg. Co.; and T. Holland Nelson, consulting metallurgist.

Nominating Committee Selects Candidates for New Officers



E. C. Bain
For President



G. B. Waterhouse
For Vice-President



G. W. Ellis W. H. Eisenman

Physical Testing Is Discussed by Scott

Disputes Theory of Tensile Test Fracture

By D. S. Klippert

Mahoning Valley Chapter, April 13—H. Scott of Westinghouse Electric & Mfg. Co.'s Research Department spoke on "Physical Testing" at the regular meeting.

Mr. Scott disagreed with the accepted theory that tensile specimens fracture first at the center. In his opinion, fractures occur first in planes at 45° to the direction of applied force, which increase the actual load considerably at the center of the specimen, causing its ultimate failure.

Theoretical calculations, Mr. Scott continued, show that under certain conditions steel has a tensile strength of approximately 9,000,000 psi. Actual figures for high tensile steels, however, do not approach this figure. Closest approximations are obtained when fractures are caused by the stresses at the center of cylinders rotated at very high speeds.

Newly elected officers of the Mahoning Valley Chapter are: Chairman, Norman Goss; vice-chairman, J. J. Bowden; secretary-treasurer, B. F. Anthony; R. Schane, A. Kent, and Erling Oyen, members of the Board. Dr. F. M. Walters, retiring chairman, also becomes a Board member.

Alloy Steel Movie Released

A new talking motion picture entitled "The Making of Alloy Steel" has been released by Bethlehem Steel Co.

The picture shows all of the processes in the manufacture of alloy steel from the charging of the open-hearth furnace through to the loading of finished bars on freight cars. Electric heat treating operations at Bethlehem are also shown.

The picture is entirely technical, is a 16-mm. film, and takes 45 minutes to show.

Over 85% of Exhibit Space Already Sold

18th National Metal Exposition Promises to Be Largest Ever Held by A. S. M.

Advance reservations of exhibit space at the 18th Annual National Metal Exposition, to be held in Cleveland's Public Auditorium Oct. 19 to 23 in conjunction with the National Metal Congress, are larger than ever before recorded for the 18 previous expositions, it has been announced by W. H. Eisenman, director of the Exposition and secretary of the American Society for Metals, sponsor of the show.

One hundred and fifty-eight companies have contracted for 55,000 sq. ft. or 85% of the exhibit space in the huge underground exhibit hall of the Auditorium.

Individual reservations are also larger than those taken by the same firms in previous years, and will include all sorts of interesting and instructive displays of machinery, processes and products of the metal industry.

In Mr. Eisenman's opinion the 1936 Exposition will be far larger than any ever staged by the American Society for Metals.

A list of the firms that have already reserved exhibit space will be found on page 10.

Interesting Facts on Spring & Music Wire Illustrated by Slides

By C. A. Mulligan

St. Louis Chapter, April 17—At the eighth monthly meeting vice-chairman C. A. Mulligan presided, Chairman C. M. Stevenson having been called out of town on business.

F. P. Zimmerli, chief engineer of the Cook Spring Co. of Ann Arbor, Mich., was the speaker. His talk pertained to helical springs from a design and material standpoint.

He also presented some interesting facts concerning the fabrication and heat treatment of spring wire and music wire, with resultant physicals and microstructures, depicted by a series of lantern slides.

An active discussion ensued, with many questions promptly and satisfactorily answered by Mr. Zimmerli.

The meeting was attended by 44 members and guests for dinner, and 73 for the evening.

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THE REVIEW

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RAY T. BAYLESS.....Editor
M. R. HYSLOP.....Managing Editor

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Second Non-Ferrous Meeting Successful

Heat Treatment of Aluminum Is Discussed Under Four Headings

By L. W. Murray

Muncie Chapter, April 16—The two meetings on non-ferrous topics held this year by the Muncie Chapter have indeed been successful.

The April meeting, held in Anderson, Ind., was given over to "Heat Treatment of Aluminum Alloys"; the speaker was L. W. Kempf of the Aluminum Co. of America Research Laboratories.

The subject was discussed under four headings: (1) Heating for hot working, (2) annealing, or heating for the purpose of reducing internal stresses or to stabilize with regard to structural changes, (3) solution heat treatment, and (4) precipitation heat treatment.

The four types of heat treatment were illustrated by detailed reference to aluminum-copper alloys.

A number of other alloy systems and commercial alloys were considered in a general way.

Heating prior to hot working is necessary to obtain the optimum structure and properties for this process. Annealing is necessary to permit successive cold rolling to specific forms.

Solution and precipitation heat treatments bring about optimum dispersion of constituents for the production of specific combinations of mechanical properties.

Ten Years Ago

On May 19 to 21, 1926, the spring sectional meeting of the American Society for Steel Treating was held in Hartford, Conn. Activities comprised a meeting of the Board of Directors, technical sessions, and plant inspection trips.

* * *

A new group of the American Society for Steel Treating was formed in Montreal on April 7. Chairman was Dr. Alfred Stansfield; vice-chairman, C. F. Pascoe; secretary-treasurer, Fred H. Williams.

* * *

The March meeting of the Indianapolis Chapter was broadcast over radio Station WFBM. R. M. Bird, then national president of the Society, spoke on "Steel Brought to the Home," and Secretary Eisenman outlined "The Romance of Steel" from earliest times to the present. An elaborate musical program was furnished by members of the Chapter.

Practical Physical Testing Discussed

New and Unusual Methods of Testing Thin Strip Given

By W. A. Gibson

Detroit Chapter, Non-Ferrous Section, March 9—Dexter Mead, superintendent of methods of the Dallas Division, Revere Copper & Brass, Inc., gave a talk on "The Practical Application of Physical Testing."

Instead of following a dry description of testing machines, Mr. Mead took up in turn the various tests, their significance as indicating the properties of material, and their value and limitations in specifications for non-ferrous materials, especially brass.

He described rather fully several unusual tests which applied particularly to fatigue and spring properties of thin strip metal. These tests are rather new and Mr. Mead used pieces of equipment which had been developed and built by his organization as illustrations.

He finished his talk with quotations from a British technical journal giving some unusual ideas which a producer of materials held regarding purchasing agents, and a well-worded reply from a purchasing agent telling his experiences with salesmen and producers. The articles were sprinkled with humor and are worth reading.

Electro-Galvanizing Has Advantages Over Older Hot Dip Coating Process

By F. H. Clark

New York Chapter, March 16—Dr. Colin G. Fink of Columbia University spoke at the regular meeting on the subject of "Protective Coatings for Metals." He classified the different types of coatings for metals as hot dipping, electroplating, chemical and anodic, fire processing, cladding, and painting and enameling.

The advantages of electro-galvanizing over the older hot dip coating are greater ductility of the coating, lower cost, and the protection of the base metal against loss of temper, as in the case of automobile tire rims.

The cathodic treatment or "hydrogen plating" has been applied to boiler tubes to prevent the formation of scale and prevent corrosion.

Chemical treatment of metallic surfaces is exemplified by the Parkerizing process (sodium phosphate) and by oxalic acid treatment.

In the cladding process, Dr. Fink said, a layer of high purity iron deposited on commercial iron was found, similar to nickel cladding, as a means of corrosion prevention.

In the discussion J. J. Crowe asked if the cathodic treatment of iron resulted in hydrogen embrittlement. Dr. Fink replied in the negative but suggested that six volts only be applied.

Gleanings from the Chapters

When Loss Is Not a Loss

We hang our heads in shame and report a loss—actually a loss—in membership for the month of April . . . But there is a catch to it—it seems that dues were payable in March and those members who haven't yet gotten around to taking care of this item have been removed from the active list and thrust into the limbo of arrears. . . . We perked up again when we found that the loss is much, much less than has been suffered in previous Aprils. . . . And the dues are still filtering in.

A blossom to the Southern Tier Chapter, the only one with no members in arrears on May first!

Seeing How It's Done

We would also like to hand a posy to Secretary Hobbie of Chicago for his graphic description of the inspection trip to Inland Steel Co. . . . The nine busloads of Chicagoans who attended this important event apparently weren't disappointed.

A trip equally as interesting was Montreal's visit to the Canadian Allis-Chalmers plant that also attracted some 300-odd visitors.

Sorry!

It is with deep regret that we learn of the death of Chairman A. C. Jones of Lehigh Valley.

Vice-chairman R. R. Kennedy of Dayton has been seriously ill for several weeks. . . . The Chapter and National Office wish him a speedy recovery.

What, no Dandelions?

Chairman Leo J. Sullivan of Rochester has recovered from his recent illness and is back on the job. . . . Leo intends to continue Bill Morgan as chairman of the committee for flowers for the sick. There's money in it, he points out. Bill just forgets about them, although it is said that he once was seen going out West Ave. with a bunch of posies in his hand.

And the Day Was Saved

A handy man around a chapter is

THE REVIEW

Churchill to Give Metal Congress Lecture Series

Physical Testing Is Subject of Lecture Course Planned For Fall Convention

Physical testing is the subject of the lecture course to be presented by Prof. H. D. Churchill of Case School of Applied Science at the National Metal Congress in Cleveland next October.

The course will be similar in nature to those presented by J. P. Gill in 1934 and by Dr. M. A. Grossmann in 1935.

There will be five lectures. The first will contain an introduction and an exposition of tension and compression testing, the second will cover shear and bend tests, the third hardness and impact, the fourth fatigue testing, and the final lecture will describe special tests and some special aspects of the general subject.

Mr. Churchill is associate professor of mechanics at Case School of Applied Science, Cleveland. He has taught in the Department of Mechanics and Materials since 1921.

In addition to his activities in the Cleveland Chapter, A.S.M., where he is chairman of the Educational Committee, Mr. Churchill is a member of the American Concrete Institute, Society of American Military Engineers, Society for the Promotion of Engineering Education, and American Association of University Professors.

Attendance Averages 132 At Peoria Lecture Course

Attendance at the winter lecture course of the Peoria Chapter averaged 132, according to J. W. Bridwell, secretary of the Chapter. The course consisted of ten lectures on the "Principles of Heat Treatment" as prepared by Dr. Marcus A. Grossmann.

One hundred and eleven new memberships have been gained as a result of this course, 55 of which are regular members and the remainder juniors. About 25 additional memberships are expected.

With such active interest in educational programs being manifested in this community, the Peoria Chapter plans to hold two such courses next season, one in the fall and one in the spring. Welding has been tentatively chosen as the subject for the fall course.

Talks on Low Alloy Steels

A. B. Kinzel, Back From European Trip, Addresses Boston Chapter

By Howard E. Handy

Boston Chapter, March 6—"Low Alloy Steels" was the subject of a very interesting talk given by Dr. A. B. Kinzel, chief metallurgist of the Union Carbide and Carbon Research Laboratories.

Dr. Kinzel had recently returned from Europe and his talk on the properties and applications of special alloy steels was greatly enjoyed by those present. The discussion was directed by Chairman W. P. Knecht.

Prior to the technical session dinner was served in Walker Memorial to about 100 members and guests of the Chapter. Professor G. F. Doriot of Harvard School of Business Administration was coffee-speaker. He is an authority on economic questions and handled his subject, "Our Present National Economic Situation," in a most entertaining and instructive manner.

Season's Growth

With the winter season just about over, chapters are preparing to close their books for the year and spend the summer in anticipation of the Metal Congress next fall. . . . A survey of the winter's work reveals that Cincinnati has grown from 79 to 118 members since last September. . . . New Jersey has jumped from 284 to 452, and averaged 90 members at dinner, 350 at the lectures and 124 at the educational courses.

Philadelphia has added 129 new members this season (the previous record was 126 for an entire year). . . . They also report a steadily improved attendance at dinner—due largely to the efforts of Charlie Stoeckel and his entertainment committee. . . . Peoria added 59 members in March and 46 in April.

All in all, not a bad season!

A. S. M. Members Assembled for Inspection Trip



The Smiles Worn by These 325 Chicago Chapter Members May Be Taken as an Indication of How They Felt About the Plant Inspection Trip Made to Inland Steel Company on April 24

Does Marital Strife Cause Good A.S.M. Attendance or Vice Versa?

Cleveland Chapter Reporter Worried by Record Crowds—Perhaps Due to Good Meetings and Speakers

By Gordon T. Williams

Cleveland Chapter, March 2—Another record crowd for the Cleveland Chapter! Either the meetings are good, or the speakers well known, or there is a lot of marital strife in our fair city. Question—do pa and ma scrap, and pa then grab his hat and go to an A.S.M. meeting, or is the chronology reversed?

There is no doubt that a good meeting and a well-known speaker contributed to the Chapter's March meeting—A. B. Kinzel of Union Carbide Laboratory gave a fine talk on Low Alloy Steels. The 185 who sat for dinner, and the additional 230 who came in later gave their hearty attention to Kinzel's fine presentation of the effects of various alloying elements on different grades of steel.

Selection of Steel Discussed

Logical and thorough was his discussion of the basis for selection of analysis to be used in steels for high-strength construction, and the many factors to be borne in mind in choosing one of these new materials. Kinzel offered a few thought-stimulating remarks on physical tests, service failures, and the use of the yield point in design.

The large crowd enjoyed to the utmost this thorough paper and the forceful presentation. A. E. Gibson of Wellman Engineering Co. contributed no small part as technical chairman, offering many comments from the fabricator's standpoint.

Coffee talker was Lt. Col. E. W. Pinger, Ordnance Executive Officer, who discussed the recent "large" military appropriation and its significance, and compared it with some other nations. Slides showed how military money has been and will be divided, and how small is the cost of the army compared to our other "overhead."

New Members to Be Signed Up

Chairman Pulsifer tearfully announced that the Chapter had fallen from grace; membership, due largely to transfers to the new Mahoning Valley Chapter, had fallen below 600. New members should be signed up, says he, in anticipation of the educational course on "Heat Treatment of Steel."

The first three lectures, by Dr. Van Horn, should be worth several times the annual dues; the second three will

reduce the value to a much lower figure. (Your correspondent handles this portion of the course.)

Phelps Wins Dinner

Programmer Bates, Educator Churchill, and Membershipman Thursday reported for their committees, mentioning plans for next year. And our good friend F. E. Phelps of Crucible Steel won the free dinner—the drawing being conducted in violation of the agitation against "bank night" and lotteries. But Farley didn't read about it!

The public address system continues to justify itself by increasing audibility in the furthest corners. The Chapter officers promise all who come that they will be able to hear everything that they should. The "nothing they shouldn't" filter is not working, so we can't guarantee that the customers won't hear that part.

Quality of Steel May Be Defined in Many Ways And Depends on Usage

By K. G. Jones

Northwest Chapter, March 10—Harry W. McQuaid of the Republic Steel Corp., Massillon, Ohio, spoke on "Quality Steels."

Mr. McQuaid stated that "quality" is very difficult to define. It depends entirely on the use.

It might be defined in one case as the ability to deform in deep drawn stock; in the oil fields, ductility and toughness are the prime factors; hydrogen sulphide in certain waters would demand the use of an alloy steel, low in carbon. Therefore, quality today depends on usage.

Before the war, quality meant soundness, freedom from inclusions, etc. This is still the European viewpoint. Here in America, however, a steel company must guarantee good machinability, freedom from cracking during quenching,—in other words, the ability to perform a certain job.

The problem of the steel company today is to meet the specifications for special jobs. From this standpoint a quality steel is one which will produce a satisfactory result on a certain job at the lowest cost.

Buildings Utilize 25% of Output of Wrought Brasses

Christie Presents Statistics on Uses and Compositions of Copper Alloys

By E. W. Moore

Rochester Chapter, April 13—Twenty years out of Yale has made John L. Christie, metallurgist of the Bridgeport Brass Co., a hardened commercialist. His business philosophy, indicated by his address on wrought brasses before the Rochester Chapter, is: Can we make it? Can you use it? What does it cost?

Of the total production of wrought brass, bronze, and related copper alloys, about one-half is in sheet form, about one-quarter rod, one-fifth pipe and tube, and the small remainder in wire form.

Approximately a fourth of the entire production goes into buildings in the form of copper sheet and brass and copper pipe and tube. Amazing quantities of the industry's output go into common, every-day articles.

Paper shotgun shells consume over 8,000,000 lb. of sheet brass per year. Electric light socket caps and shells consume about 7,000,000 lb. of sheet and 3,500,000 lb. of rod. The rubber tire industry consumes about 3,000,000 lb. of rod in the form of tire stems.

Mr. Christie pointed out that his own company's production includes about 75 different alloys. Of these, 16 compositions make up 90% of the output and two compositions (common high brass and free-cutting brass rod) account for almost half of the output.

With the aid of blackboard and slides, Mr. Christie explained the effect of differences in composition. Lead in particular embrittles brasses both at high temperatures and low. A good, free-cutting screw stock contains 3% lead.

The case of a compromised composition was very interesting. A free-cutting screw stock contains 61% Cu, 36% Zn, 3% Pb; it machines well but does not stand much cold deformation. Rivet wire contains 65% Cu, 35% Zn, and no lead, stands cold deformation well, but does not machine readily.

A compromise composition containing about 63% Cu, 35.5% Zn, and 1.5% Pb gives moderately good machining qualities and permits a reasonable amount of cold deformation.

Mr. Christie's talk invoked one of the most enthusiastic question periods of the season, and he answered many questions.

Nine Busloads Of Chicagoans Visit Steel Co.

Chicago Members See Modern Methods of Steel Making At Inland Plant

By K. H. Hobbie

The largest and most successful inspection trip ever conducted by the Chicago Chapter was held at the plant of the Inland Steel Co., Indiana Harbor, on the afternoon of April 24.

Nine large Greyhound buses and many private automobiles were required to transport more than 325 members and guests to the mills, which were overwhelmed by the largest group of visitors ever to swarm down upon a busy plant. Nevertheless, the trip went through as scheduled under the efficient arrangements of J. H. Nead, chief metallurgist of Inland.

The group was first conducted to the charging floor where hungry furnaces were fed a proper diet for the grades of steel desired.

On the pouring floor, where a 125-ton heat was tapped, everyone was thrilled by the huge mass of white-hot metal filling a giant ladle until slag accumulations spilled over the brim. From the ladle a series of ingot molds were filled and moved out of the building on narrow-gage railroad flat cars to cool for stripping.

Visit Rolling Mills

In single file along the catwalk above the blooming and hot rolling mills, the visitors moved, feeling the rising heat from the hot steel billets shooting back and forth between different pairs of rolls, and ducking the stream of brilliant sparks coming from the friction saw that cut finished bars to length—sparks that seemed to bombard the catwalk but actually fell short.

At the continuous strip mill, rolling out a hot tongue of steel at the rate of 1350 ft. per min., visitors lingered, fascinated, as long as time would permit. Speed of production with no apparent manual control or handling constituted a novelty witnessed by many for the first time.

The path of strip and sheet was followed on through the cold rolling mills, where it was finished in the variety of gages, widths, and lengths required in the trade. Part of the strip production is diverted to the tin plating department where automatic machines apply the coating of tin and stack the finished plate in neat piles, ready for inspection and shipment.

Wilfred Sykes Addresses Group

The inspection finished, the group journeyed to the Shoreland Hotel for dinner and heard Wilfred Sykes, assistant to the president of Inland, speak on "Modern Developments in the Steel Industry."

Mr. Sykes first outlined the evolution of an automobile body and a tin can from the ore deposits, coal mines, and stone quarries, and described each successive manufacturing process.

An interesting point was that the development of continuous rolling mills had been retarded for many years because bearing materials suitable for four-high roll stands were not available, because synchronous motors had not attained a sufficiently accurate degree of control, and because success was too uncertain for the expense involved.

Mr. Sykes then explained three reels of motion pictures which showed the actual development of hot strip rolling, beginning with the original hand-operated mills, and ending with the present-day continuous mill.

Tom Nelson Is Guest Speaker

Compares Welding to Melting And Heat Treating

By J. W. McBean

Ontario Chapter, April 3—Dr. T. Holland Nelson, old friend of the Ontario Chapter, was speaker for the April meeting, held at the Royal Connaught in Hamilton.

Dr. Nelson showed the similarity of conditions in the metals worked by the welder, melter and heat treater, though the volumes of material dealt with vary widely. In each case the time, temperature, and pressure were shown to have an important bearing on results.

The production and prevention of pipe in ingots was illustrated and slides showed analogous results under similar conditions in weld metal. The presence of blowholes is common to both processes, and since both produce a cast structure, the crystalline formation is similar.

A number of slides of weld metal showed this very clearly and also illustrated cavities and dendrites.

In the manufacture of iron and steel the nature of the slag is a significant factor. Similarly in arc welding the slag produced by the modern covered rod considerably affects the results.

The atmosphere, whether oxidizing or reducing, also has an important bearing on welding, as it does in the manufacture and heat treatment of steels. The effect of adjoining layers of weld metal is similar to a normalizing treatment, and the forcing of melted metal between the two cold walls of a weld is similar to the pouring of hot steel into a cold ingot mold.

Nominations for the May election were made, and the popular annual field day announced. It is to take place in June with Bob Murray in charge as usual for a fine program of events.

Weather Talk, Committee Reports and Lecture on Research in Final Meeting

By Hugh E. Brown

Cleveland Chapter, May 4—The final meeting of the season was held at the Cleveland Club with a record-breaking crowd in attendance.

The coffee talk was given by Cleveland's local weather forecaster, Ralph C. Mize, who explained very skillfully why weather predictions do not always come true. He told how data are collected from many sources and used to plot on the weather map the expected travel of storms across the country.

As is customary on the last meeting of the season, the new officers were installed, and Chairman Harry Croft announced the plans for the coming season.

The chairman of the various committees then gave résumés of their intended work. They are A. T. Code, Outing Committee; H. D. Churchill, Program Committee; C. E. Swartz, Educational Committee; A. M. Thurston, Convention Committee; H. I. Dixon, Reception and Registration Committee; G. T. Williams, Roster Committee; A. H. Allen, Publicity Committee; and W. O. Kurtz, Membership Committee.

Technical chairman John S. Richards, director of manufacturing practice, American Steel & Wire Co., introduced the speaker of the evening, Dr. John Johnston, director of research, United States Steel Corp. Dr. Johnston gave a very fine talk on "Trends of Research in Metallurgy."

He brought out very nicely the fact that the future of metallurgy holds much in store for all engaged in this

Larger Airplanes Use Metal-Covered Wings, Fuselages

By Samuel Epstein

Columbus Chapter, April 13—Before a large audience J. B. Johnson, chief of the Material Branch of Wright Field, talked on airplane materials and design.

Mr. Johnson's well-known competence helped create the impression that United States aviation, both military and civil, is in the front rank in metallurgy and engineering.

The most important factor governing the design of airplanes is low weight. Wood, high strength alloy steel, aluminum and magnesium alloys have about equal strength-weight ratios and are still competitive materials for the lighter airplanes, but over 80% of the larger transport airplanes have metal-covered wings and fuselages.

The development of the welded steel fuselage increased the use of carbon and later of alloy steel, but in the past five years this construction has been eclipsed by the aluminum alloy stressed skin monocoque type of airplane.

Sheet is the basic form of raw material from which the modern airplane body is built. Stainless steel and magnesium alloys can compete with aluminum alloys on a strength-weight basis, but in actual usage the aluminum alloys dominate the field. Alclad sheet has recently been accepted as standard.

Propellers are made mostly of forged aluminum alloy or of welded alloy steel.

The problem is to improve fatigue resistance, and much has been accomplished by improving the homogeneity of the aluminum alloys and the welding technique for steel blades. Fatigue cracks develop slowly, and it is possible to detect them before they become dangerous by etching the aluminum alloy with a caustic solution and by inspecting the steel blade with magnaflux powder.

Corrosion Is LaQue's Topic

Nature, Theory and Tests Are Described at Washington

By G. W. Quick

Washington Chapter, April 20—"Corrosion Factors as They Influence Corrosion Tests" was the subject presented by F. L. LaQue of the Development and Research Department, International Nickel Co., at a meeting held in the Garden Room of the Dodge Hotel.

Mr. LaQue mentioned briefly the electrochemical nature of corrosion with especial reference to ways in which hydrogen may be removed from the system in corrosion processes.

This led to a discussion of the role of oxygen in corrosion reactions and its dual effect in accelerating corrosion of some materials and retarding corrosion of others. Such other factors as velocity and temperature were discussed, showing how the effect of temperature is complicated by its secondary effect in the concentration of oxygen in solution.

How high velocity and impingement can combine to destroy protective films of corrosion products in such applications as brass condenser tubes was described. The use of nickel-copper alloys was cited as a solution to this particular corrosion problem.

The speaker then discussed the nature and mechanism of oxygen concentration cells. In chromium alloys (stainless steels) this type of corrosion is complicated by active-passive cells more powerful than the simple oxygen concentration cells.

Galvanic corrosion was the next topic. The speaker stressed the great importance of the relative areas of the anodic and cathodic members of couples in determining the extent of galvanic corrosion. In many cases simple potential measurements are relatively unimportant.

The talk was concluded by a brief description of some sea-water corrosion tests on pipe and plate recently inaugurated by the International Nickel Co. in cooperation with the Ethyl Dow Chemical Co., Wilmington, N. C.

Si Bronze Has Better Physicals Than Tin Bronze

By Ralph Leiter

Philadelphia Chapter, March 27—W. B. Goudielock, metallurgist of the Phelps Dodge Copper Products Corp., was the guest speaker at our first non-ferrous meeting of the season. A very interesting talk was given on "Copper-Silicon Alloys."

Mr. Goudielock dealt largely with silicon bronze of the composition copper 95.5%, silicon 3.5% and iron 1.0%. This comparatively new alloy was developed to take the place of tin bronze.

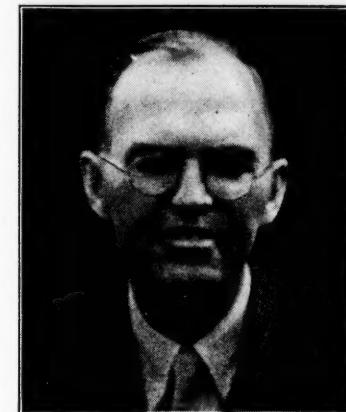
The physical properties of silicon bronze are, almost without exception, superior to those of the tin bronzes. This fact, together with a 6% lower specific gravity, allows a substantial weight saving.

Castings are sound and have nearly the same density as forgings. Resistance to corrosion is somewhat superior to that of the tin bronzes.

A great number of questions were asked on melting, casting and forging practice. The discussion brought out the fact that precipitation hardening occurs in silicon bronze at about 450°F. The strength is increased by approximately 5000 psi.

Chairman George Keller announced

Obituary



A. C. Jones

A. C. JONES, who died May 6 of cerebral embolism, was currently chairman of the Lehigh Valley Chapter of the A.S.M.

He was born in Chicago in 1891 and was a graduate of Crane College of Technology. In 1922 Mr. Jones became associated with the Lebanon Steel Foundry as research engineer and chief metallurgist, a position which he held until his death.

He was a recognized authority on steel castings, both carbon and alloy, and was the author of several technical papers on various phases of the subject.

Mr. Jones was also a member of the American Foundrymen's Association and the American Society for Testing Materials, and was active in the committee work of both organizations.

ON JAN. 12 the Rockford Chapter lost one of its staunchest supporters in the death of ERIC EKSTROM, president of the Mechanics Universal Joint Co.

Mr. Ekstrom has held a sustaining membership in his own name ever since the inception of the Rockford Chapter and has also maintained individual memberships for various members of his organization. He cooperated to the fullest degree in all of the undertakings of the Chapter and the loss occasioned by his death will be severely felt.

Mr. Ekstrom was also vice-president of the Borg-Warner Corp. and eminent in the automotive parts field.

ELWOOD THOMAS IKES (Pittsburgh Chapter, A.S.M.) died suddenly of heart failure on April 17.

Mr. Ikes was born in Germantown, Pa., April 30, 1877, and was educated at the University of Pennsylvania. He was associated with Carnegie Steel Co. from 1906 to 1916, and later, for a short time, with the Midvale Steel & Ordnance Co., Coatesville, Pa.

For the past 18 years he has been associated with Columbia Steel & Shafting Co. as engineer in charge of metallurgical work and development. He was a director of the company.

Mr. Ikes was a member of the Society of Automotive Engineers and the American Society for Testing Materials as well as the American Society for Metals.

another new record for this season—129 new members. The previous record was 126 for an entire year.

Attendance at dinner preceding the lectures has steadily improved throughout the year—believed to be due largely to the efforts of Mr. Stoeckel and his entertainment committee. One of the excellent after-dinner speakers they have secured this year addressed the March meeting. He was Commander W. A. Teasley, U.S.N., who spoke on "Life Underseas."

He briefly summarized developments in submarines, but spent most of the time in recounting his thrilling and humorous experiences underseas.

HERE AND THERE WITH A.S.M. MEMBERS

LEHIGH Valley Chapter loses an active member (three years on the Executive Committee) when NEIL METCALF, for the past eight years metallurgist for Treadwell Engineering Co. of Easton, Pa., joins the Burlington Steel Co., Ltd., Hamilton, Ont., Canada, as metallurgist.

Much of Mr. Metcalf's early training was received in England, where he was graduated from University of Wales, Cardiff, and was employed by Ebb Vale Steel, Iron and Coal Co., Ltd., by Ford Motor Co. at Manchester, and by Guest, Keen and Nettlefolds, Ltd., Cardiff, Wales.

* * *

RECIPIENT of the J. H. Whiting Medal at the annual dinner of the American Foundrymen's Association in Detroit, May 8, was DAVID McLAIN, member of the Milwaukee Chapter, A.S.M.

Mr. McLain's first foundry experience was twisting hay into ropes for core barrels at the age of ten. At 15 he was a molder in the first successful steel foundry in this country, and at 23 was a foreman in charge of the first Bessemer converter steel foundry.

Mr. McLain's chief contribution to modern foundry practice consists in his "McLain's Systems," a correspondence course in mixing irons and cupola practice which has been used by some 5000 students. In 1910 he perfected his system of steel foundry practice by electric, converter, and open-hearth processes.

* * *

RECOGNIZING the growth of engineering at Lehigh University and the need for coordinating the various departments under one head, the board of trustees recently appointed BRADLEY STOUGHTON, head of the Metallurgy Department, as first dean of engineering. At the same time the Ph.D. degree in metallurgy has been re-established after a lapse of 42 years.

Professor Stoughton is a one-time adjunct professor of metallurgy at Columbia University with Henry Marion Howe; it was there in 1908 that he wrote his standard text "Metallurgy of Iron and Steel." From 1913 to 1921 he was secretary of the American Institute of Mining and Metallurgical Engineers.

During the stress of the War years he served on numerous national committees. In 1922, under the administration of President Harding, he prepared a report on the 12-hr. day in the steel industry that resulted in the adoption of the 8-hr. day.

In 1922 he was elected president of the American Electrochemical Society, and a year later accepted the chair in metallurgy at Lehigh.

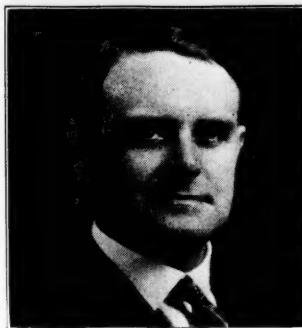
* * *

A NEW appointee at Massachusetts Institute of Technology is JOHN M. LESSELLS as associate professor of mechanical engineering.

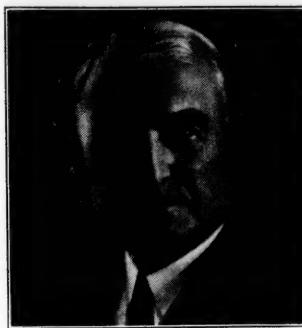
Mr. Lessells brings to his new position a wide background of experience on both sides of the Atlantic. Born in Scotland and educated at Glasgow University, he was employed during the War on inspection of engine parts and materials for Rolls-Royce, Armstrongs, and the British War Office.

He then came to Pittsburgh and served for 11 years as manager of the Applied Mechanics Division of Westinghouse Electric and Mfg. Co., and was later transferred to Philadelphia as engineering manager of the Turbine and Diesel Department. He recently resigned to form a consulting engineering firm with G. B. Karelitz.

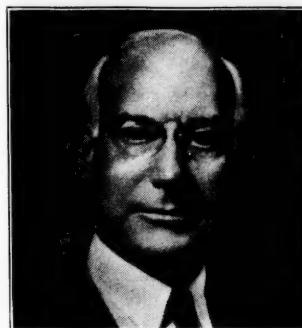
Mr. Lessells is a member of the A.S.M., the American Society of Me-



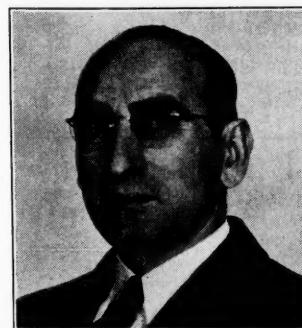
Neil Metcalf



Harry Hardwicke



Bradley Stoughton



Harry Kicherer

Neil Metcalf has joined the Burlington Steel Co., Hamilton, Ont., as metallurgist. Harry Hardwicke has been appointed district manager of Latrobe Electric Steel Co. Bradley Stoughton becomes first dean of engineering at Lehigh University, and Harry Kicherer has been made works manager at American Hoist & Derrick Co.

chanical Engineering, whose *Journal of Applied Mechanics* he edits, the American Society for Testing Materials, the Iron and Steel Institute, and Institution of Mechanical Engineers of Great Britain. The latter, in 1926, awarded him the Bernard Hall prize for a paper on fatigue and elastic limit.

* * *

NORMAN E. WOLDMAN, co-author with A. J. Dornblatt of a comprehensive book on "Engineering Alloys" to be published by the American Society for Metals June first (see page 7), assumed the position of chief metallurgist and vice-president of Eclipse Aviation Corp. on May first. He was formerly metallurgical engineer for the United States Navy.

He brings to Eclipse a wide academic experience as well as several years spent as research metallurgical engineer for Westinghouse Electric & Mfg. Co. He attended Western Reserve University and Case School of Applied Science, received his M.S. at Ohio State and his Ph.D. at Columbia University. He has taught at University of Maine,

University of Illinois, United States Naval Academy Postgraduate School, where he was head of the Department of Metallurgy and Chemistry, and at Carnegie Institute of Technology.

He also has to his credit a book on "Physical Metallurgy" published in 1930.

* * *

LINDBERG Steel Treating Co. has a new metallurgist in the person of Roy G. Roshong. Mr. Roshong has been associated with Canton Steel Foundry Co., Canton Drop Forge Co., Canton Sheet Steel Co., Dayton Engineering Laboratories, Newport Rolling Mill Co., Wadsworth Watch Case Co., United Alloy Steel Co., and, most recently, the Hoover Co.

He is a former chairman of the Canton-Massillon Chapter of the A.S.M., and is also active in committee work for the American Society for Testing Materials. He is a member of the British Institute of Metals, Electro-Chemical Society, American Institute of Chemical Engineers, and Tau Beta Pi, honorary engineering fraternity.

Rochester, Southern Tier and Syracuse Chapters Have Joint Meeting at Cornell

By E. W. Moore

On April 20 the Rochester Chapter of the A.S.M. journeyed to Ithaca to hold a joint meeting with the Southern Tier and Syracuse Chapters at Cornell University.

An excellent program had been arranged, with Prof. Herman Diederichs of Cornell as master of ceremonies.

Activities started at 3:15 in the afternoon with a trip through the mechanical engineering laboratory and shops. Following this a talking motion picture, accompanied by music, was presented by Republic Steel Corp. It showed the melting, casting, and fabrication of stainless steel.

After a demonstration of the metal-

lizing spray gun arranged by Professor Diederichs, dinner was served at 7:00 p.m. to 175 members and guests in the William-Straight Hall on the Campus.

The evening lecture was delivered by Edgar C. Bain, assistant to the vice-president of U.S. Steel Corp. His subject, "The Role of Common Alloying Elements in Steel," was presented with even more than his usual brilliance before this large assembly of members.

The Rochester Chapter takes this occasion to congratulate Professor Diederichs and the officers of the Southern Tier and Syracuse Chapters on the tremendous success of this meeting at Cornell.

WITH a background of 20 years' experience in the manufacture of construction equipment, road machinery, and other mechanical products, HARRY J. KICHERER comes to American Hoist & Derrick Co. of St. Paul as works manager.

His previous affiliations were with Caterpillar Tractor Co. and Russell Grader Co. He was graduated in mechanical engineering from University of Iowa.

Mr. Kicherer is a past chairman of the North West Chapter, A.S.M.

* * *

TWENTY-ONE years' association with the tool steel industry in the Chicago district have convinced HARRY HARDWICKE that "dues in the American Society for Metals pay big dividends in educating customers and thus lessening the steelman's troubles." Harry has recently been appointed district manager of Latrobe Electric Steel Co., and the Chicago Chapter is therefore richer by one sustaining membership.

The 21 years in the tool steel industry were spent with Atlas Crucible Steel Co., later Atlas Steel Corp., and Ziv Steel and Wire Co.

* * *

FOR THE past 13 years A. W. DEMMLER has been a member of the American Society for Metals and has been employed by Vanadium Corp. of America in Bridgeville, Pa., in various capacities. His latest appointment is as metallurgical engineer in the Research & Development Department.

A graduate of Penn State College with an M.S. from M.I.T., Mr. Demmler continued his studies at the Royal Technical University of Stockholm, Sweden, as Fellow in Electrometallurgy of the American-Scandinavian Foundation. After teaching electrometallurgy at Penn State, he entered the metallurgical department of United Alloy Steel Corp., and later joined the Vanadium staff.

* * *

OSCAR O. MILLER has resigned from American Sheet and Tin Plate Co., where he was research associate, to join the staff of Mellon Institute of Industrial Research, Pittsburgh, as industrial fellow.

Mr. Miller received his B.S. in chemical engineering from Grove City College and his M.S. in chemistry from New York University.

* * *

MUIR L. FREY comes to the metallurgical staff of Republic Steel Corp. in Buffalo from John Deere Tractor Co. in Waterloo, Iowa, where he has been chief metallurgist for the past ten years and was responsible for metallurgical and mechanical improvements in the manufacture of transmission gears.

His technical education was obtained at University of Missouri School of Mines and Metallurgy, and his early experience at U.S. Bureau of Mines, Caterpillar Tractor Co., and Gerlinger Electric Steel Casting Co.

* * *

DR. ANCEL ST. JOHN, consulting engineer for the St. John X-Ray Service, Inc., Long Island City, N. Y., is fortunately recovering from a concussion which laid him up for 18 months.

He informs us that during this disability his laboratory has been busy installing some very up-to-date diffraction apparatus and portable X-ray equipment for field inspection work.

Tells History Of Resistance Alloy No. 10

**S. L. Hoyt Traces Development
Of Iron-Chromium-Nickel
And Iron-Chromium-
Aluminum Alloys**

By Oscar E. Harder

Columbus, Dayton, and Cincinnati Chapters, March 9, 10 and 11—The history and development of heat resisting alloys were briefly reviewed by Dr. S. L. Hoyt before he took up in greater detail the more recently developed alloys. Dr. Hoyt is director of metallurgical research at A. O. Smith Corp., Milwaukee.

One of the oldest electric resistance materials is platinum, which is expensive and has rather high vapor pressure at elevated temperatures.

Marsh Invents Ni-Cr Alloy

The nickel-chromium alloys invented by Marsh were the first good base-metal heating elements, and these alloys have recently been improved by better manufacturing methods. Nickel tends to form the carbonyl in CO atmospheres. The melting point and scaling limit the operating temperature of these alloys.

Next come the iron-chromium alloys, which show good resistance with chromium content of 15 to 30%. These alloys are body-centered cubic in arrangement and are not as strong at high temperature as the face-centered cubic alloys, such as 20% Cr, 80% Ni.

They have not been used for heating elements because of relatively low heat and electric resistance and high temperature coefficient as compared to the nickel-base alloys, but they have good resistance to oxidation and to sulphur-containing fuels.

The chromium-nickel-iron alloys are the most important heat resisting alloys and are used in large tonnage. With high chromium content they can be used with cheaper fuels, while if nickel is high, the face-centered cubic lattice of greater strength at elevated temperatures is obtained.

The 65% Ni, 15% Cr, balance iron alloy is extensively used for carburizing boxes. Other typical combinations are 35% Ni, 15% Cr; 25% Cr, 12% Ni; 18% Cr, 8% Ni.

New Fe-Cr-Al Alloys

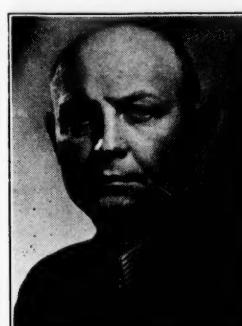
Iron-chromium-aluminum alloys were introduced about 1913, also by Mr. Marsh. Recently a number of new Fe-Cr-Al and Fe-Cr-Al-Co alloys have made their appearance. Dr. Hoyt showed by charts the ranges in compositions covered by the Marsh, Armstrong, Cooper, Jaeger, Ruder, and Hoyt and Archer patents, and discussed such trade alloys as Alcress, Ohmax, Megapry, and Kanthal.

The Hoyt and Archer patent covers Smith Alloy No. 10, containing approximately 37.5% Cr, 7.5% Al, balance mainly iron, along with minor ingredients. This alloy can be made to show a "life test" of 100 hours at 2600° F. Though brittle at room temperature, only moderate heating is required for forming, and it was shown that a wire could be bent after heating with a match.

Chas. Taylor Sons Co. Moves

The Chas. Taylor Sons Co. of Cincinnati, Ohio, manufacturers of P. B. Silimanite and fireclay refractories, announces the removal of the Eastern District office to the Hudson Terminal Bldg., 30 Church St., New York. Ripley Quinby is district sales manager.

Promotions at Republic Steel Corp.



Stanley A. Knisely

Forrest H. Ramage

Chester W. Ruth

Stanley A. Knisely, formerly manager of the Advertising and Sales Promotion Division of Republic Steel Corp., has been appointed director of advertising for the Corporation and all its subsidiaries. Forrest H. Ramage has been promoted from assistant manager of the Advertising and Sales Promotion Division to sales promotion manager, handling work in connection with the new Product Development Division. Chester W. Ruth, formerly assistant manager of the Advertising and Sales Promotion Division, is assistant director of advertising.

H. J. French Addresses Annual Sauveur Night at Philadelphia

By Ralph Leiter

Two years ago the Philadelphia Chapter had the honor and privilege of having Dr. Albert Sauveur as guest speaker at the February meeting.

Dr. Sauveur's talk was so greatly appreciated and the speaker so beloved that it was decided to call each February meeting "Sauveur Night," and to engage a distinguished speaker to talk on some phase of the heat treatment of steel, the subject dearest to the heart of Dr. Sauveur. Guest speaker this year was H. J. French of International Nickel Co.

In reply to Chairman George Keller's hearty invitation to be guest of the Chapter, Dr. Sauveur sent the following letter:

Permit me to express to your officers, and through you to the members of the Philadelphia Chapter my deep appreciation of your kindness to me. Nothing is more worth while in this life than the realization that you have won the esteem and friendship of those who know you and I shall be forever grateful to the Philadelphia Chapter for giving me this precious satisfaction.

I wish indeed that I could be with you on the 28th, but I find that it will not be possible. That I will be present in spirit, I need not say.

This was followed by a telegram sent the day of the meeting:

Deep appreciation and warm greetings to the members of the Philadelphia Chapter and to your distinguished lecturer. Regret keenly inability to hear lecture and to be with you.

Mr. French gave a very clear and interesting talk on resistance to fatigue and its relation to hardening. Several points made in his talk were outstanding:

1. Retained austenite in quenched steel is necessary for good fatigue resistance.
2. New and better age hardenable

Data on Meehanite Given In Talk on High Test Iron

Southern Tier Chapter, March 23—In spite of a week's postponement due to flood conditions, 72 men were present at the meeting.

The speaker was A. M. Ondreyco, chief metallurgist of the Meehanite Metal Corp. With the aid of charts and slides Mr. Ondreyco gave a very excellent talk outlining the history of the development of high strength cast iron.

A number of foundrymen were present in the audience and contributed to an instructive discussion. Although reluctant to deliver what might be considered a sales talk on Meehanite metal, interest in the process was so keen that Mr. Ondreyco was finally persuaded to present some information on the subject.

Flying Club in Toronto Meets With Chapter

**R. R. Moore Gives Lecture on
Aircraft Engine Metals;
Local A.S.M.E. Also
Represented**

By J. W. McBean

Ontario Chapter, March 6—The very timely subject of "Metallurgy in Aircraft Engine Construction," was presented by R. R. Moore, metallurgist of the Naval Aircraft Factory at Philadelphia.

The local branch of the A.S.M.E. and the Toronto Flying Club were invited to this meeting. Chairman Bull of the A.S.M.E. and Messrs. Cleverley, Brown, Curtis, and Murray of the Toronto Flying Club, spoke briefly.

Mr. Murray, who is local manager of the De Haviland Co., still adheres largely to the use of wood in fuselages, partly because of the advantages of lighter frame, larger pay-load, and less vibration and drumming.

Mr. Murray humorously said that all-metal construction will doubtless eventually prevail and his present viewpoint may well be considered as all wrong. Mr. Moore, however, assured him that the perfect metal had not yet been found.

Half of Weight Is Light Alloys

Mr. Moore confined his remarks to airplane engines. In the present radial type nearly half of the weight takes the form of light alloys of aluminum and magnesium with nearly half of various steels, and about 2 or 3% of bronze. No cast iron is used.

Weight has been reduced from 2½ lb. per hp. in 1922 to less than 1½ lb. in 1936 and about 1¼ lb. at present. Recent tests show it will soon be possible to bring the weight down to a little over 1 lb. per hp. This reduction has been utilized to get increased power.

Some of the factors which affect selection of steels are strength, elastic limits, uniformity of hardening depth, forgeability, and machinability.

Various Steels Used

Mr. Moore took up the use of various steels — nickel, nickel-chromium, molybdenum, vanadium, carbon — used in such parts as studs, rockers, connecting rods, valves, valve seats, springs, etc. To resist corrosive action of tetraethyl lead at high temperatures, the use of a steel containing 14% Ni, 14% Cr, 2½% W seems to be preferable.

Progress in the use of the light cast aluminum alloys is shown in the fact that fins on a cylinder head can now be made 1¾ in. deep with a pitch of 0.2 in. This involves close attention to gating, melting, and pouring temperatures.

Aluminum Foundry Practice

A very close control (about $\pm 10^{\circ}$ F.) is also maintained on the quenching temperature. A rather striking effect was shown in the variation of porosity in pistons due to a change in gate position.

Some of the things which tend to start fatigue failures are inclusions, seams, hairlines, sharp corners, shrink fits, abrupt changes in diameter, and identifying marks. Even slight surface imperfections such as machining marks, should be eliminated.

Endurance limits on various steels and aluminum alloys with different notches were illustrated by slides. The Rockwell test is applied to each piece to check strength and heat treatment.

The Magnaflux method of inspecting for cracks and seams was clearly illustrated. For instance, a long crack in a valve spring was plainly indicated by the powder adhering to it.

Metallurgical Microscopes Discussed at Los Angeles Under Two Classifications

Martin Silge of Carl Zeiss, Inc., Tells About Equipment for Shop Man and Metallurgist; Adequate Illumination Is Important Factor in Studying Structure

By Louie W. Mosley

Los Angeles Chapter, April 15—The program of the evening consisted of a dinner at the Central Manufacturing District Club, an exhibit of metallurgical equipment, and an address on the subject of "Metallurgical Microscopes."

Dr. D. S. Clark, presiding in the absence of Chairman C. E. Burt, introduced the guest speaker, Martin Silge of the San Francisco branch of Carl Zeiss, Inc.

Mr. Silge divided his subject into two divisions—microscopes used by the shop man, and those used by the metallurgist.

The former is usually a simple microscope or magnifier with magnification of 10 or 12 times. Although magnifications up to 30 times are available, they are not very practical because of the shallow depth of focus and the shortness of focal length.

Disadvantage of Simple Magnifier

Another disadvantage of the simple magnifier is that only one eye can be used, prohibiting a three-dimensional view. A binocular microscope gives this three-dimensional depth or relief, but for shop work is not advisable for magnifications greater than 50 times; beyond this power the depth of focus becomes too shallow, and the field of view too small.

Mr. Silge devoted the greater part of his time to a discussion of metallurgical microscopes used for studying the structure of metal. One of the first requisites of this type is adequate illumination of the specimen.

Two principles are commonly used. With light-field illumination the light falls vertically upon the object, lighting it evenly. In dark-field illumination, a more recent improvement, the light is thrown almost horizontally across the upper surface of the specimen. This gives greater contrast and definition.

The type of light is an important factor. A point source is ideal, and is most closely approximated by an arc light.

The concentrated filament lamp using six volts, however, gives a close approximation to a point source and is quite satisfactory for average work. It is the least expensive in first cost, is cheap to run, and stands up well under occasional overloads.

Objective Lens Is Important

One of the most important parts of the microscope is the objective lens. These are of various types and qualities, for light correction, marginal correction of the lens, etc. The achromatic lens is common, and with the best lenses of this type fluorite is used as the corrective material. The greatest perfection has been achieved, however, as far as correction of optical errors is concerned, in the apochromatic objectives.

The ocular, or eyepiece, is also an important part. Mr. Silge mentioned the compensating ocular and other types, and spoke of marginal distortion and of the types of lenses used for correcting this phenomenon.

Objectives can be divided into three degrees of curvature, for which three types of correction lenses will serve for all purposes.

Contrary to the common impression that high magnification is the only quality desirable in a microscope, Mr.

Silge showed that a combination of magnification, resolving power, and technical perfection of the optical system is the criterion by which a microscope should be judged.

He explained the numerical aperture,

and derived an expression for determining its value. He then derived a further expression defining the limit of the minimum distance between two points that can be resolved with a given numerical aperture and wave length of light. This value is a measure of the resolving power of the microscope.

Polarized Light Gives Contrast

Mr. Silge also described and illustrated by slides the types of microscopes used in the various phases of metallurgical work. Some slides of photomicrographs illustrated the striking contrasts possible with the use of polarized light illumination as opposed to ordinary illumination.

At the conclusion of the talk by Mr. Silge the exhibits were inspected by

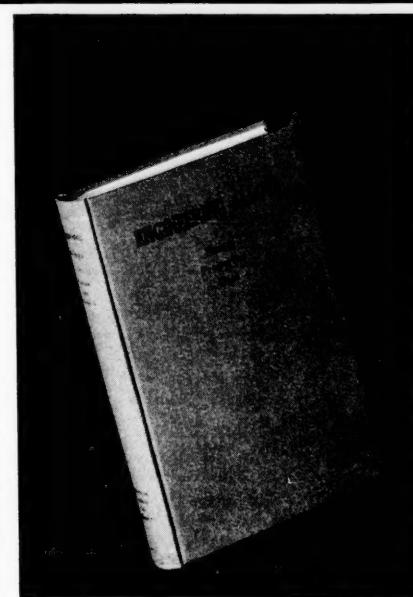
members and visitors. A large and valuable collection of optical instruments and recording and controlling pyrometer equipment was on display. Exhibitors included Bausch & Lomb Optical Co., the Braun Corp., Bristol Co., Illinois Testing Laboratories, Leeds & Northrup Co., E. Leitz, Inc., Pacific Scientific Co., representing the Foxboro Co., C. J. Tagliabue Mfg. Co., Wilson Mechanical Instrument Co., and Carl Zeiss, Inc.

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Cleveland Men Visit Body Plant

Talk on Die Castings Follows Afternoon Inspection Trip To Fisher Body Corp.

By Gordon T. Williams

Cleveland Chapter, April 6—Another big crowd turned out for the Cleveland Chapter's April meeting.

Over 100 took in the afternoon inspection trip through the Fisher Body Corp.'s local plant. Modern manufacturing methods were observed in this fine plant, one of the largest and most up-to-date in the Cleveland district. Manufacture and assembly of automobile bodies and accessory parts were shown in clear detail.

A really large crowd of 160 sat for dinner at the Cleveland Club and were highly entertained by a coffee talk on baseball by Jack Graney, old-time star left fielder for Cleveland and now a radio broadcaster at WHK.

Croft Elected Chairman

This being annual election night, a unanimous vote was cast for the following slate of officers: Chairman, Harry P. Croft; vice-chairman, Gordon T. Williams; secretary-treasurer, Hugh E. Brown; executive committee, A. H. Allen, A. A. Bates, H. D. Churchill, H. P. Coats, H. I. Dixon, W. O. Kurtz, P. J. McKimm, C. E. Swartz, A. M. Thurston, and, ex-officio, retiring chairman H. B. Pulsifer.

This means at least one important improvement in the Chapter and in THE REVIEW; this report is the last which your present correspondent will present. To the more tender mercies of Hugh Brown we commend you.

Colwell Principal Speaker

The technical chairman, Dr. Carl Swartz of Cleveland Graphite Bronze Co., introduced the principal speaker, D. L. Colwell of Stewart Die Casting Corp., Chicago.

Mr. Colwell's able discussion of "Die Castings" included a review of the machines and production methods used in the industry. He discussed aluminum and zinc-base die casting alloys, paying particular attention to the work of the A.S.T.M. in testing both types of alloys. Some of the more recent results of exposure tests were clearly presented.

A comprehensive picture of this highly specialized industry gave us all new ideas of its value and probable future development.

Regional A.S.M. Meeting at Penn State



A group of A.S.M. members gathered on the steps of the Mineral Industries Building at Pennsylvania State College during the second biennial inter-chapter meeting held May 1 and 2.

Chapter Speaker Is Flood Victim; Open Discussion Meeting Held

By L. E. Raymond

New Haven Chapter, March 20—The March meeting was held in the Hotel Stratfield in Bridgeport. Unfortunately the scheduled speaker had the misfortune of being in Pittsburgh during the inundation of the city. He finally found an airplane to take him back to New England, but he was landed on the east side of the Connecticut River, which was no more passable than the "Golden Triangle" whence he had just fled.

The emergency committee therefore found that an open discussion meeting would be most acceptable.

After a report on recent developments in steels by Henry Smith of R. Wallace and Sons Co. of Wallingford, the meeting was turned over to Sam Spalding of the American Brass Co. He outlined the general analyses of the different high speed cutting steels in use today and requested comment from the members on their experiences with these tool steels. The following spoke briefly in order:

L. E. Raymond of Singer Mfg. Co. on experiences with 19-4-2.

M. J. Radecki of Henry G. Thompson Sons Co. on experiences and heat treating methods with molybdenum and molybdenum-tungsten high speed steels.

F. J. Dawless of Crucible Steel Co. on the recent developments in high speed steels from the viewpoint of the man supplying the steels as well as the

commercial tool making companies.

R. Porter of the Heppenstall Co. on experiences with the different steels and heat treatments in die block manufacture.

George Bunting of Firth-Sterling Steel Co. on cobalt-bearing high speed steels and the cemented carbides.

Johannes Erler of Farrel-Birmingham Co. on experiences with the cemented carbides.

Charles A. Lampard of Grundy and Lampard, commercial heat treaters, on the problems of the heat treating shop.

Mr. Spalding then spoke briefly on the newer high strength engineering steels.

CORRECTION!

An important omission was made in a recent advertisement of The Nitralloy Corp. in "Metal Progress." In listing the companies licensed by Nitralloy to act as agents, the name of the Lakeside Steel Improvement Co., 5418 Lakeside Avenue, Cleveland, was not included. "Metal Progress" regrets this omission since C. W. Derhammer, president and general manager of the Lakeside Steel Improvement Co., has been active for several years in the promotion of nitriding.

Oilmen Take Over Meeting in Calif.

Program Includes Three Talks on Metals for Oil Industry; Corrosion Is Biggest Problem

By Louie W. Mosley

Los Angeles Chapter, February Meeting—A program was arranged by Turner Smith of the General Petroleum Corp., consisting of three talks on metals for petroleum refinery service. The speakers were introduced by Dr. D. S. Clark, presiding in the absence of chairman C. E. Burt.

G. F. Olsen, manager of Research Laboratories for General Petroleum Corp., gave a general outline of petroleum refining processes. Corrosion today is still one of the biggest problems, just as it was in the country's first refineries.

A typical modern oil distillery was explained in detail. An idea of the metallurgical problems encountered was given in Mr. Olsen's statement

that some of the pipes, boilers, and containers are subjected to pressures as high as 900 psi., and to temperatures ranging up to 975° F.

Magnesium chloride is frequently found in solution in the water which is carried in an emulsified state in practically all crude oils. Upon heating to refining temperatures, hydrochloric acid is formed, resulting in an aggravated corrosion in the zone of condensation. Such corrosion can be controlled by the injection of ammonia gas or solid alkalis into the stream of oil under process.

An illustrated talk on "Examples of Refinery Corrosion" was given next by James E. Hill, assistant superintendent of distillation and cracking, Union Oil

Company of Calif., Wilmington, Calif. Sulphur and its compounds, naphthenic acid and magnesium chlorides are the corrosive agents usually encountered.

Hydrogen sulphide and hydrochloric acid types of low temperature corrosion were explained with slides and samples of steel pipe and plate. A section of a 0.62-in. wall cracking tube was shown where selective high temperature naphthenic acid corrosion had almost completely eaten away the heat input side of the tube while the opposite side had depreciated only about 10%.

Even slight corrosion simultaneous with fatigue may cause failure at nominal stresses far below the ordinary endurance limit. Severe stressless corrosion prior to fatigue is usually much less damaging than cyclic or inter-crystalline corrosion accompanied by fatigue.

Fire-box corrosion causes severe outside scaling and reduction of effective tube wall. Chromium-molybdenum-titanium or columbium alloys or calo-

Six Chapters in Joint Meeting at State College, Pa.

Meeting Lasts Two Days; Six Papers are Presented

Six chapters of the American Society for Metals met for the second biennial inter-chapter meeting at Pennsylvania State College, May 1 and 2.

More than 150 members were present representing the Pittsburgh, Philadelphia, Lehigh Valley, York, Southern Tier, and Penn State Chapters.

The meeting was opened on Friday afternoon with a few words of welcome from D. F. McFarland, head of the Department of Metallurgy of Penn State's School of Mineral Industries. Short speeches were also made by Edward Steidle, dean of the School of Mineral Industries, and by Robert S. Archer, president of the A.S.M.

This was followed by a technical program comprising papers on grain size by E. C. Bain of United States Steel Corp., and by Reinhold Schempp of Halcomb Steel Co., and on stainless steels by V. N. Krivobok of Carnegie Institute of Technology.

An informal dinner and entertainment were held Friday evening at the Nittany Lion Inn.

At the second technical session, on Saturday morning, Gilbert E. Doan of Lehigh University spoke on invisible rays in engineering, James G. Morrison of Landis Machine Co. on grinding cracks in tool steels, and T. Holland Nelson, consulting engineer, on welding.

rized stock have been recommended for this type of severe service.

The concluding speaker was P. D. McElfish, materials engineer for Standard Oil Co., who spoke in detail concerning the metals used for various refinery services.

Mr. McElfish enumerated several grades of steel used in heating coil tubes and showed how compositions are varied to meet specific conditions. Where corrosion is not severe and temperatures are comparatively high, carbon-molybdenum tubes are used.

Other compositions with varying amounts of chromium were listed. In general, corrosion resistance is proportional to the percentage of chromium.

Mr. McElfish reported that so far no tubing material has been found that is completely resistant to hydrochloric acid corrosion, the only recourse being to neutralize the acid.

Mr. McElfish concluded his talk with the statement that pumps in refinery service are subjected to exceptionally severe service and that every precaution must be taken to prevent failure.

MacQuigg Attacks Theoretical Angle Of Stainless Steel

Takes View That Solid Solution May Not Be Stable Condition

By Adolph O. Schaefer

Philadelphia Chapter, April 24—The last technical meeting of the season was devoted to the subject of stainless steels, and attracted a large audience.

C. E. MacQuigg of Union Carbide & Carbon Co. was the speaker. He discussed recent developments in stainless steels with respect to the protective film theory.

He presented the rather unusual view that a solid solution is not necessarily a stable condition, even at a fixed temperature—an idea accepted by some and disputed by others.

Perhaps the purely theoretical angle of stainless steels has been too long neglected. Certainly Mr. MacQuigg's remarks caused a very spirited discussion.

Members hastened to present their experiences with the peculiarities of various grades of stainless and to attempt explanations in the light of the protective film theory.

The Chapter dinner preceding the meeting was addressed by Don Rose, well-known columnist of the Philadelphia Ledger. Mr. Rose's philosophy of life, well embellished by a large stock of anecdotes and stories, was the introduction to a delightful evening.

Another feature of a busy evening was the annual election of officers. For chairman Dr. T. Holland Nelson emerged victorious over no rivals at all, to the great satisfaction of everyone. Charles H. Stoeckle of the Crucible Steel Co. was elected vice-chairman, and Adolph O. Schaefer of the Midvale Co. was re-elected secretary-treasurer.

Two new directors are Joseph Winlock of Edward G. Budd Mfg. Co. and Richard C. Jordan of Chicago Flexible Shaft Co.

Bulletin on Blowers Issued

A folder devoted to the application of rotary positive blowers in foundry cupola service has just been issued by the Roots-Connersville Blower Corp., Connorsville, Ind. Copies may be had by requesting Bulletin 22-B12.

Theoretical Aspects of Hardening Applied to Practical Heat Treatment

By P. W. Oliver

Springfield Chapter, March 9—The meeting was opened by Chairman Robert S. Rose with the announcement that the Grossmann lecture course would be given under the auspices of the Springfield Chapter starting Monday, March 16.

Donald Reed, humorist, was then introduced and entertained the members with many funny stories.

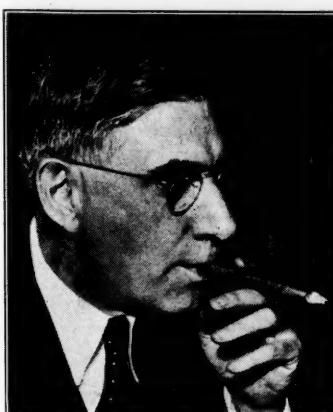
E. S. Davenport was the principal speaker. His subject was "Some New Aspects of the Hardening of Steel."

Mr. Davenport first discussed the subject of heat treatment from the viewpoint of continuous cooling cycles from temperatures above the transformation range.

He pointed out how the slower cooling rates yield the softer pearlitic structures and how, as the speed of cooling is increased, the transformation of austenite to ferrite and carbide (pearlite) is depressed by "undercooling" to lower temperatures with consequent increase in the fineness and hardness of the pearlite. With high speeds of cooling (quenching) the steel transforms to the fully hard or martensitic condition.

The speaker then discussed the subject of heat treatment from the view-

Awarded Medal



A. L. Marsh

Albert Leroy Marsh, president and general manager of Hoskins Mfg. Co., was awarded the John Price Wetherill Medal of the Franklin Institute for "outstanding discoveries in the physical sciences." The story of Marsh's development of nickel-chromium resistance alloys is contained in the May, 1935, issue of Metal Progress.

Dayton Ends Season With "High Flyer"

By F. B. Fuller

Dayton Chapter, April 16—The regular season was wound up with a "high flyer" at Wright Field, center of aircraft experimentation for the U. S. Army Air Corps.

A dinner served in the cafeteria to 85 persons was followed by an interesting trip through the new Museum, after which J. B. Johnson, chief of the Materials Branch, gave a most enlightening talk on aircraft materials.

He covered the changes in types and designs of aircraft and the materials used. Many questions showed the interest of the audience in aviation.

Mr. Johnson is past chairman of the Dayton Chapter and this was the first occasion on which the members could hear their "home-town" talent. The large turn-out was ample commendation for his appearance and lecture.

point of the austenite transformation when it is caused to take place at constant temperatures below the equilibrium transformation or critical range, and correlated this viewpoint with that, previously discussed, on continuous cooling practices.

The third portion of the lecture concerned certain applications of constant temperature transformation studies and the possibilities of practical heat treatments based on such data.

Mr. Davenport demonstrated, by actual bend tests, the superior toughness and ductility developed in plain carbon steels when heat treated by new methods based on these constant temperature transformation studies as compared to properties developed in the same steel at the same hardness by the customary quench and temper method.

Welded Tubing Handbook

A 58-page "Handbook of Welded Steel Tubing" has been published by the Formed Steel Tube Institute. It contains a thorough review of the application of welded steel tubing, its physical, chemical, and metallurgical properties, commercial tolerance limitations, and extensive engineering data.

Copies may be had without charge upon request to Steel and Tubes, Inc., 224 East 131st St., Cleveland, Ohio.

Abrasive and Grinding Facts Prove Valuable To Men in South Bend

By Walter C. Troy

Notre Dame Group, April 2—The guest speaker was H. W. Dunbar, manager of the Grinding Machine Division of the Norton Co. Mr. Dunbar's talk on abrasives was outlined in the March REVIEW along with a discussion of his truly refreshing method of supplementing his talk with cartoons.

To provide for sound projection of the movie "The Alchemist's Hourglass," the meeting was held in the University Theater on the Campus.

Some of the fundamental principles affecting grinding operations that were presented proved of vital importance to many South Bend men using abrasives. Although the degree of accuracy obtained in the final product cannot exceed that of any machine element involved, it was shown that routine production operations are maintained with almost unbelievable accuracy when abrasive methods are resorted to.

Grain Size Made Clear

Grossman Gives Instructive Lecture at Tri-City

By E. F. Bicknell

Tri-City Chapter, March 3—Dr. Marcus A. Grossmann, director of research of Carnegie-Illinois Steel Corp., Chicago, spoke to some 90 members and friends on the subject of "Grain Size" at a dinner meeting held at the Fort Armstrong Hotel of Rock Island, Ill.

Dr. Grossmann's interesting and instructive lecture cleared away much of the mystery surrounding this very important subject. He told how the grain size characteristics of a piece of steel, as determined by the McQuaid-Ehn test, were related to other austenite grain sizes which may develop in the steel, and how this austenite grain size is modified by heat treatment and by working the steel.

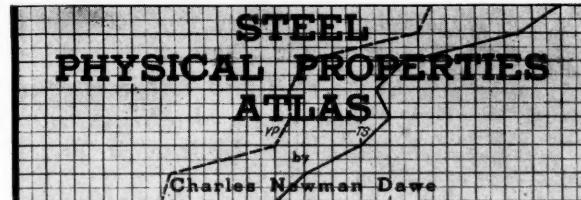
He also discussed briefly the rather complex relationships of grain size with toughness and machinability.

How Much Time Do You Spend

Looking Up Physical Properties?

- How often have you spent hours at a time in search of exact physical property data on a particular steel? How often have you tried to find this information in the volumes of already published data?

Every one who works with steel knows how this information is scattered through the four corners of the metal industry. Now, for the first time, these data are concentrated in one authoritative reference book—it is available at a glance in



- The "Steel Atlas" is an authoritative new reference book on the physical properties of popular steels and steel castings with charts presented in three colors. Compiled in a new and unique manner and illustrated with thirty-five attractive graphs, you get at a glance the properties of steels as affected by carbon content, alloy content, heat treatment, tempering treatments and other influencing factors.

For the first time, engineers, designers, metallurgists, chemists and others engaged in the use of steels can have in one compact volume the authoritative physical property data they need. You will want this accurate reference book to physical properties of S.A.E. steels, cast steels, plates, rounds and 18-8 stainless steels and several of the new high tensile strength steels. Send order and check today.*

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McQuaid Talks At Big Meeting

Steel Mill Representatives and Many Celebrities Are Present

By George E. Rose, Jr.

Chicago Chapter, April 9 — The largest attendance of the year heard an interesting illustrated lecture by Harry W. McQuaid of Republic Steel Corp., at the April meeting, held at the Medinah Athletic Club. Approximately 365 members and guests were present, including many representatives of Chicago district steel mills.

More than forty officials and employees of the Carnegie-Illinois Steel Corp. filled five tables at the dinner preceding the lecture. They were headed by J. E. Lose, vice-president in charge of operations, and A.S.M. Trustee Walter Mathesius, manager of operations for the Chicago district. A smaller contingent from Inland Steel was grouped about several other tables. National President Bob Archer led the Republic Steel bunch. Past-President Fletcher Harper and Past-Treasurer Arthur T. Clarage were also present.

Mr. McQuaid discussed "The Importance of Aluminum Additions in Modern Commercial Steels." He was introduced by Dr. Marcus A. Grossmann of Carnegie-Illinois Steel Corp.

In his characteristic informal and effective manner, Mr. McQuaid drew from his vast personal experience in tracing the development of aluminum in steel-making from an addition supposedly harmful in its final effect to a key material in determining the characteristics of a given heat of steel.

Before the lecture, Mr. Greswold Van Dyke entertained the group with an enlightening discussion of amateur photography. He illustrated the possibilities of making attractive photographs by enlarging miniature snapshots, and compared the cost and efficiency of small and large cameras.

Final plans for the inspection trip through the Indiana Harbor plant of the Inland Steel Co. were announced before the meeting adjourned.

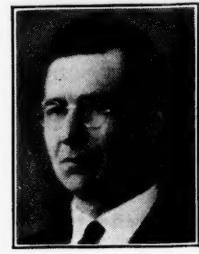
Dr. Solakian Appointed Research Metallurgist At A. F. Holden Co.

Dr. Haig Solakian has been appointed research metallurgist of the A. F. Holden Co., according to announcement by A. F. Holden, president.

Dr. Solakian received the degree of B.S., M.S., and D.Sc. from the Massachusetts Institute of Technology. He specialized in metallurgy.

He has had extensive experience in the practical problems of industry, having worked at Bethlehem Steel Co. as steel melter. He left there to accept a position as metallurgist and superintendent of the Pyrites Co.

Later he went with the Remington Typewriter Co. as chemist and metallurgist, and then to the United States Mining and Refining Co. as research metallurgist. From there he went to the United States Bureau of Standards as research metallurgist, and finally to the Geometric Tool Co. as chief metallurgist, from which he resigned to join the Holden Co.



Harry McQuaid

EXHIBITORS AT METAL SHOW

The following 158 firms have reserved 57,000 sq.ft. of floor space at Cleveland's Public Auditorium, scene of the National Metal Exposition to be held Oct. 19 to 23:

Acme Steel Co.	Foxboro Co.	Minneapolis-Honeywell Regulator Co.
Air Reduction Sales Co.	Fulton Foundry & Machine Co.	Milne & Co., A.
Ajax Electric Co.	Gas Machinery Co.	Monarch Steel Corp.
Ajax Electrothermic Corp.	Gathmann Eng. Co.	National Cylinder Gas Co.
Allegheny Steel Co.	Gas Products Co.	National Industrial Publishing Co.
Aluminum Co. of America	General Alloys Co.	National Tube Co.
American Brass Co.	General Electric Co.	New Jersey Zinc Sales Co.
American Car & Foundry Co.	General Electric X-Ray Corp.	North American Mfg. Co.
American Electric Furnace Co.	Globar Corp.	Norton Co.
American Gas Association	Gogan Machine Corp.	Ohio Crankshaft Co.
American Gas Furnace Co.	Gordon Co., Claude S.	Olsen Testing Machine Co., Tinus
American Metal Market	Grasselli Chemical Co., Inc.	Pyerometer Service & Supply Co.
American Rolling Mill Co.	Grob Brothers	Page Steel & Wire Co.
American Sheet & Tin Plate Co.	Handy & Harman Co.	Park Chemical Co.
American Steel & Wire Co.	Harding Bros., Inc.	Parker-Kalon Corp.
Armstrong Cork Co.	Hauck Mfg. Co.	Partlow Corp.
Automatic Temperature Control Co.	Haynes Inc., C. I.	Pittsburgh Instrument & Machine Co.
Automotive Industries	Heat Treating & Forging	Pyrometer Service & Supply Co.
Babcock & Wilcox Co.	Hevi Duty Electric Co.	Republic Steel Corp.
Baldwin-Southwick Corp.	Hobart Bros. Co.	Rieble Division, American Machine & Metals Mfg. Corp.
Bastian-Blessing Co.	Holden Co., A. F.	Roehling's Sons Co., John A.
Bethlehem Steel Corp.	Hollup Corp.	Ryerson & Sons, Inc., Joseph T.
Bell & Gossett Co.	Hones, Inc., Chas. A.	Safety Gas Lighter Co.
Blakeslee & Co., G. S.	Hoskins Mfg. Co.	Salem Engineering Co.
Bliss & Laughlin, Inc.	Houghton & Co., E. F.	Scherr Co., Inc., George
Bristol Co.	Illinois Testing Laboratories, Inc.	Selas Co.
Brown Instrument Co.	Ingersoll Steel & Disc Co.	Sentry Co.
Burdett Mfg. Co.	International Nickel Co., Inc.	Spencer Turbine Co.
Calorizing Co.	Iron Age	Steel City Testing Laboratories
Carboley Co., Inc.	Jelliff Mfg. Co.	Stuart & Co., D. A.
Carborundum Co.	Johns-Manville Corp.	Surface Combustion Corp.
Carnegie-Illinois Steel Corp.	Jones & Laughlin Steel Corp.	Tagliabue Mfg. Co., C. J.
Caste Hardening Service Co.	Kelley Co., The J. W.	Timken Steel & Tube Co.
Chapman Valve Mfg. Co.	Kelley-Koett Mfg. Co., Inc.	Titanium Alloy Mfg. Co.
Climax Molybdenum Corp.	Kemp Mfg. Co., C. M.	Una Welding, Inc.
Columbia Tool Steel Co.	Lakeside Steel Improvement Co.	Union Carbide Co.
Continental Industrial Engineers	Leeds & Northrup Co.	United States Steel Corp.
Crown Rheostat & Supply Co.	Leitz, Inc., E.	Vanadium Corp. of America
Dayton Rogers Mfg. Co.	Lewis Machine Co.	Victor Saw Works, Inc.
Despatch Oven Co.	Lincoln Electric Co.	Welding Engineer
De Walt Products Co.	Linde Air Products Co.	Wells Mfg. Corp.
Dixon Crucible Co., Jos.	Lindberg Engineering Co.	Wheelco Instruments Co.
Dow Chemical Co.	Machinery	Wilkins-Anderson Co.
Driver-Harris Co.	Macklin Co.	Williams & Co.
Du Pont De Nemours & Co., E. I.	Magnaflex Corp.	Wilson Mechanical Instrument Co.
Eclipse Fuel Engineering Co.	Magnetic Analysis Corp.	Youngstown Sheet & Tube Co.
Electric Furnace Co.	Mahr Mfg. Co.	Zeiss, Carl
Electric Alloys Co.	Mallory & Co., Inc., P. R.	
Electro Metallurgical Corp.	Manhattan Rubber Mfg. Co.	
Ensign-Reynolds, Inc.	Marburg Bros., Inc.	
Firth-Sterling Steel Co.	Metal & Thermit Corp.	
Ford Sales Co., The J. B.	Metallizing Co. of America	
Fox Co., C. A.	Metals & Alloys	
	Michigan Products Corp.	
	Michigan Steel Casting Co.	
	Midvale Co.	

Remarkable Advances In Machines and Tools In Recent Years Shown

Peoria Chapter, March 9—The remarkable advancement in machines and machine tools during the past few years was clearly pointed out by Sol Einstein, chief engineer of the Cincinnati Milling Machine Co., at the regular monthly meeting.

The meeting was held at the cafeteria of the Caterpillar Tractor Co., where a dinner served country style proved very popular. Over 200 were in attendance.

Mr. Einstein described the gradual evolution of man's tools from the primitive hammer, chisel, file and saw to the complicated, yet flexible, machines that are common in our shops today. Even in 1900 shop machinery was relatively simple, but progress since then has been rapid.

The tendency today is to produce machines that are adaptable to as wide a range of work as possible so as to operate at minimum cost. The efficiency and range of work of the centerless grinder was adequately demonstrated by figures and slides.

After the work is ground, it can be given a finer finish in a lapping machine where a tolerance of 0.000025 in. in roundness and 0.0005 in. in straightness and size is not uncommon and where a finish can be obtained so perfect that no flaw can be detected even under a powerful microscope.

The development, varied uses, and high production obtained by the modern broaching machine were also shown.

Mr. Einstein presented a movie film showing chip formation with various forms and types of cutting tools. It illustrated the characteristics of the build-up edge and the effect that the different rake angles have on this formation as well as the finished product.

Montreal Chapter Has Plant Visitation

(Continued from Page 1)
motors, to operate at a hoisting speed of 3000 ft. per min.

The huge drums, 25 ft. in diameter, equal to a three-story house, will wind up a load 4000 ft. from underground in the twinkling of an eye, drop the load and repeat to the tune of 27 cycles per hr.

To the layman it is hardly conceivable that such a huge mass of iron and steel may be started, accelerated to full speed, come to rest, and reverse at full speed every 2½ min., hour after hour, day in and day out, without more disturbance, noise or vibration than an ordinary automobile.

The total weight of this hoist exceeds 1,250,000 lb., the shafts alone weigh 38 tons each. The cable would extend 1 ¼ miles in length and weighs 45,800 lb., not counting the weight of the skips and ore which will be suspended on the two ends.

In addition to the main display, the Canadian Allis-Chalmers Shops were tidied up for the occasion and modern machine tools, representing investments exceeding \$1,000,000, were inspected by the crowd, including work in process of manufacture, products of the company, such as crushing and grinding mills, centrifugal pumps, rubber-lined sand pumps, texrope drives, hydraulic turbine equipment and various kinds of special work.

Light refreshments were served and the trip was concluded by 11 p.m.

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1 Leitz Apochromatic Oil Immersion Objective
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Says "Button Pushers" Will Run Machines

Iron Age Editor Makes Startling Predictions at Southern Tier Annual Meeting

Southern Tier Chapter, May 18—"The industrial machine operators of the future will be merely button pushers, and the only time they will come into real action is when something goes wrong, which will be very infrequently," John H. Van Deventer, editor of *The Iron Age*, told 250 members and guests of the Southern Tier Chapter at the Binghamton Country Club.

Addressing the largest annual meeting ever held in the history of the Chapter, Mr. Van Deventer made some startling predictions for the future in the course of his address on "The Machine Age in 1950."

I.B.M. Plant Visited

Walter F. Titus, vice-president of International Business Machines Corp., Endicott, N. Y., acted as toastmaster. The metal men had made a tour through his plant in the morning and participated in athletic activities at the I.B.M. Country Club during the afternoon.

Prizes were awarded to John O'Sullivan and R. O. Allen who took first and second places respectively in the golf tournament. Ray T. Bayless, assistant secretary of the national organization, was awarded the skeet shooting prize.

Chairman W. S. Bennett announced the results of the election of officers for the following year. W. R. Stamp of the American La France & Foamite Corp. is the new chairman, W. C. Lincoln of Ingersoll-Rand Co. vice-chairman, W. J. Squire of the Eclipse Machine Co. was re-elected treasurer, and K. J. MacKenzie of International Business Machines Corp., was re-elected secretary.

New directors are L. C. Conradi, F. L. Phillips, and Ben Rathbun.

Machines Increase Employment

Mr. Van Deventer is widely known as an authority on industrial problems, and his predictions for the future in industry were as startling as they were authoritative. Condemning the viewpoint that machines are putting people out of work, he pointed out that with the upbuilding of the machine age new doors of opportunity and employment are opened up at a faster rate than the old doors can be closed.

Mr. Van Deventer made some interesting forecasts for the metal trade industries based on present trends.

"Some of the greatest developments have been made in the line of alloy steels," he said. "Thirty-five years ago when I had a shop of my own, we had only two kinds of steel to work with—soft steel to make things of, and hard steel to make things with. Now we have more than 8,000 commercially listed alloys.

"After this period of diversification, we will undoubtedly have an era of simplification in alloys. By furthering our research on heat treating of metals, we will be able to reduce the number of necessary alloys, and heat treat them by different methods to serve our various requirements."

Bayless Congratulates Chapter

Ray T. Bayless, assistant secretary of the A.S.M., congratulated the Southern Tier Chapter on the remarkable progress which it has made.

Prof. C. W. Mason of the Baker Laboratory at Cornell University reviewed progress at Cornell in promoting courses of metallurgical study.

L. C. Conradi, metallurgist of International Business Machines Corp., gave a short talk. He is considering the introduction of courses in the I.B.M. educational program so that employees at Endicott will have the opportunity of studying metallurgy and metallography.

Meeting Held On Cast Iron

**Includes Plant Visit and Talk
By J. S. Vanick**

By Howard E. Handy

Boston Chapter, April 3—The Boston Chapter's annual Cast Iron Meeting was divided into two parts, an afternoon plant visitation, and an evening technical session.

Approximately 100 members and guests assembled at the plant of the Hunt-Spiller Mfg. Corp. at 2:00 p.m. This company pioneered in the manufacture of air furnace iron for heavy ordnance, and for the past 35 years has been widely known for castings used extensively in the frictional parts of locomotives, diesel and marine engines.

Hunt-Spiller has laid particular stress upon research, both from the standpoint of manufacture and of introduction and maintenance in the railroad and marine fields. The foundry was in full operation and the visit was concluded with a trip through the new chemical and physical testing laboratories.

At 4:30 the group assembled at the Boston Chamber of Commerce and listened to a talk by Captain Charles J. Van Amberg, Department of Public Safety, Commonwealth of Massachusetts.

Captain Van Amberg is recognized as a national authority on the ballistics of small arms. He has been connected with all of the homicide cases in Massachusetts in recent years and explained the use of ballistic studies in the detection of such crimes. He showed a large number of slides and answered many questions about specific crimes.

A turkey dinner was served at 6:30 in the Lounge Room, and after this excellent meal R. F. Harrington, metallurgist, Hunt-Spiller Mfg. Corp., outlined the history and product of the plant that had been visited in the afternoon.

He then introduced J. S. Vanick, foundry metallurgist, International Nickel Co., who presented some "Short Sketches of Recent Progress with Cast Iron." Mr. Harrington directed the lengthy discussion which followed Mr. Vanick's presentation.

2500 Miles Covered by Members to Hear Gill

By M. W. Caruthers

Rhode Island Chapter, March 4—A record-breaking attendance of members and guests traveled cumulative distance of 2500 miles on March 4 to hear James P. Gill, chief metallurgist of the Vanadium-Alloys Steel Co., discuss "Physical Properties and Recent Developments of High Speed Steels."

The subject of high speed steels has been dealt with in a thorough manner on a great number of occasions, but Mr. Gill's comments were so selected and arranged that he presented this interesting subject with a new and modern aspect.

The seven different types of high speed steels commonly used today were rated as to their efficiency, using as a basis the three requirements of a cutting tool made of this material. Mr. Gill also covered very thoroughly the merit rating of the various brands as related to their resistance to softening at elevated temperatures, toughness at room temperatures, wear resistance, cutting ability, and resistance to grain growth.

The 45-minute discussion period following the talk is an indication of the enthusiastic participation of those in attendance.

Behavior of Weld Metal on Heat Treatment And Thermal Stress Relief are Discussed

By F. H. Clark

New York Chapter, April 20—At a joint meeting with the American Welding Society a talk was given by J. C. Hodge, Babcock & Wilcox Co., entitled "The Thermal Treatment of Welds."

The subject was discussed in two parts; the first related to the conditions surrounding the deposition of weld metal, to the thermal treatments to which weld metal is subjected coincident with the welding deposition, and to the fundamental behavior of various types of weld metals on heat treatment. The second part centered on residual welding stresses and the necessity for thermal stress relieving treatment.

The influence of multiple bead or layer deposition on grain structure of the weld metal as contrasted with the structure of single-layer welds was illustrated with macrographs and photomicrographs.

Changes in chemical composition of weld metal were briefly discussed, and shown to be dependent upon the degree of protection given the molten metal in the arc from nitrogen and oxygen in the atmosphere.

Effect of Nitrogen

The behavior of high nitrogen and low nitrogen weld metals on annealing, normalizing, water quenching, and aging, was considered. From such studies the nature of certain microstructural constituents in weld metal has been definitely established.

Residual stresses in welded structures, said Dr. Hodge, are manifested in the

Speaks on "Testing"

H. C. Mann Discusses Practical Aspects of Tension Test

By G. W. Quick

Washington Chapter, March 16—The characteristic static stress-strain diagram and the practical significance of the terms related to the tension test were discussed by H. C. Mann, research engineer, Watertown Arsenal, who addressed a meeting in the Garden Room of the Dodge Hotel.

The various methods for determining proportional limit, yield strength, and other values were explained and the need for a wider dissemination of information regarding the behavior of materials under tension loading was emphasized.

It was pointed out that the true-stress curve based on the reducing area of the specimen represents the elastic strength increase produced by cold work, and has a practical significance in that it may be used to predetermine the strength of a material after cold rolling or cold drawing. The true-breaking stress based on the final load and reduced area at the break was explained as having a direct relation to the microstructure of the material.

In discussing dynamic testing, the relation between the static true-stress diagram and energy value obtained from similar specimens of the same material was explained. It was pointed out that the energy absorption value is dependent on volume, microstructure, and impact velocity.

The velocity of testing was shown to be a most important factor. A special high velocity tension impact testing machine designed for striking velocities up to 1000 ft. per sec., which was developed by the speaker, was described.

Mr. Mann's lecture was well received by the Washington Chapter, and it was the consensus that he covered this field of mechanical testing fully in a most interesting presentation.

Pinch-Hits for V. N. Krivobok

Hicks Gives Interesting Lecture On Stainless Steels

By E. W. Moore

Rochester Chapter, March 9—Substitute for Dr. V. N. Krivobok, who was unable to address the Chapter because of illness, was Dr. Laurence C. Hicks, associate research engineer of Allegheny Steel Co. He spoke very interestingly on stainless steels, the subject Dr. Krivobok had chosen.

Dr. Hicks first reviewed the history of stainless steel and then gave a complete exposition of the constitution diagrams of the various alloys. Although Bethlehem Steel Co. received the first license, Allegheny Steel Co. made the first commercial 18-8 heat.

Chromium-irons are rendered free machining by the addition of phosphorus, sulphur and selenium. They are softened by box annealing, or the non-hardening variety containing aluminum or other elements can be used.

Dr. Hicks' discourse on 18-8 aroused considerable interest. When nickel is added to iron-carbon-chromium alloys, they can be hardened by cold working only.

Carbide separation will occur at elevated temperatures and cause intergranular corrosion under corrosive conditions. Columbium or titanium is recommended to counteract this effect. When carbides have already separated, annealing at 1800° F. will redissolve them.

For welding, columbium should be added to both rod and base metal if high temperature is to be encountered.

Dies for working stainless must be kept clean and sidewalls free from impregnated erosive materials.

The application determines the particular type of stainless to use for best results. Highly accelerated tests are not as satisfactory as testing under actual conditions.

Dr. Hicks answered many questions and the Chapter voted him a great pinch-hitter.

Employment Service Bureau

Address answers care of A. S. M., 7016 Euclid Ave., Cleveland, unless otherwise stated

POSITIONS WANTED

ELECTRIC MELTING: Position desired in the electric melting department of a steel company. College graduate; three years experience on cold charge, basic electric furnaces; one year in physical and metallurgical laboratories. Any job, any place, and any hours will be considered provided opportunity for further study and advancement is presented. Box 5-5.

METALLURGIST: 37 years old; Case graduate; 16 years experience in metallurgical research and control. Now sales engineer but desires to return to active metallurgical work, preferably ferrous. Also qualified as inspector, chemist and superintendent of heat treating department. Box 5-10.

SUPERVISOR, INSPECTOR OR INSTRUCTOR OF ARC WELDING: steel or welding equipment salesman. Practical man; 8 years experience; knowledge of metallurgy, heat treating and physical metallurgy. Member A.S.M. and A.W.S. Available July 1. References. Box 5-15.

WELDING ENGINEER: Engineering college graduate; metallurgical training; 7½ years experience in the development, production and application of various types of electrodes to manual and automatic welding. Experience in both fundamental and practical aspects of welding. Box 5-20.

SALES METALLURGIST: 3 years plant and 6 years selling experience in alloy steels. Clineteel in Middle Atlantic states. Thorough knowledge of chemical and metallurgical problems involved in applications for alloys. Box 5-25.

METALLURGIST: Young American woman with B.S. and M.S. Broad training in general metallurgy and physics. Rich experience in research laboratory and abroad as technical assistant and consultant establishing laboratory and technical control. French, German, Spanish and Russian at command. Desires new connection. Has excellent record of research studies and economies through skillful diagnoses. Box 5-30.

POSITIONS OPEN

FURNACE DESIGNER: Wanted by a manufacturer of electric furnaces. Man with experience designing and estimating electric heat treating furnaces; batch, continuous and salt bath. Give full details of experience, references and salary desired in first letter. Position will be permanent to right man. Box 5-40.

RECENT GRADUATE or man with 2 or 3 years experience in non-ferrous physical metallurgy for development work and plant control in large automotive parts manufacturer in northern Ohio. State training and other qualifications. Box 5-45.

YOUNG engineering graduate not over 28 years old, with some industrial process and sales experience, for sales promotion work. One who has also studied university courses in economics, marketing and advertising preferred. Must be free to spend at least one year of the country, in preparation for work in sales promotion department of manufacturer of instruments and control equipment. Work will include planning, writing and laying out direct-by-mail pieces, data sheets, sales manuals, and catalogs. Write describing education and experience, and stating age and salary desired. Box 5-50.

METALLURGICAL SALES ENGINEER: On alloy bars and carbon and alloy seamless tubes. Splendid opportunity for ambitious young man with technical training. Applicants must have had at least 3 years experience in steel mills. Applications considered strictly confidential. Box 5-55.

METALLURGIST: Must be experienced in gray cast iron metallurgy and cupola operations. Must have general knowledge of heat treatment of steel and be able to check incoming materials and products, both steel and cast iron. Not less than 35 years of age preferred. Box 5-60.